

DRAWINGS ATTACHED

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(71) We, HOWORTH AIR CONDITIONING LIMITED (formerly James Howorth & Company Limited), a British Company, of Victoria Works, Lorne Street, Farnworth, Bolton BL4 7LZ, Lancashire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a mattress, particularly but not exclusively, for use in the treatment and resuscitation of patients in hospital, or at home.

In order to resuscitate a patient after extensive surgery it is desirable that the body be enclosed in a microclimate, that is an environment containing conditioned air. This air may be bacteria-free and have its temperature and humidity controlled to prevent excessive metabolism and remove strain from the patient's heart, or alternatively, accelerate healing of, for instance burns.

It is an object of the present invention to provide a mattress whereon a patient, suffering, for instance, from shock, hypothermia or burns, can be supported and his body, which may be covered by a sheet, exposed to a microclimate of conditioned air to encourage resuscitation, which is relatively cheap to manufacture and which does not require a very large air supply. It is desirable that free flow of this air is not hindered or stopped by compression of the mattress by the weight of the patient supported thereby.

Accordingly the invention provides a mattress comprising a lower panel of air-impermeable material, an upper panel and means for supplying air to the space between the panels the space between the panels being divided into a plurality of compartments each containing a resilient element, and the upper panel having at least part of its area perforate and provided with apertures whence conditioned air from the said compartments can issue and so im-

pinge on and pass around a patient lying on the mattress.

The upper panel can be of air permeable material and thus be effectively perforate over its entire surface or can be of an air impermeable material and have a central area thereof provided with apertures to render it air permeable.

By "conditioned air" is meant air which may be bacteria-free and of a predetermined temperature and humidity.

Preferably the panels are generally rectangular and attached to each other along lines parallel to the longitudinal edges of the panels so as to divide up the interior of the mattress into a plurality of compartments in the form of inter-connected ribs.

Advantageously, the ribs comprise two pairs of side ribs and one or two end ribs, disposed beneath the imperforate peripheral border of the top panel, and a plurality of longitudinally extending central ribs disposed beneath the central area of the top panel.

Conveniently each central rib has a resilient element in the form of a spine. Each such spine can extend centrally of each central rib and so divide the rib into two air supply channels along which air can pass even when the spine is compressed by the weight of a patient.

The supply means can comprise a header manifold, disposed parallel to but outside one end rib, or inside an end rib, and connected to a supply of conditioned air, and two supply tubes, connected to the manifold and one end extending inside one of each pair of side ribs of the mattress. When the manifold is disposed outside the mattress a slot is provided at each end of the said one end rib to allow easy entry of the tubes. Each tube has its end remote from the header open, if a second end rib is provided, for supplying air to the other end rib, and an aperture adjacent its manifold end for supplying air to the one end rib.

Each tube is conveniently of foamed plastics material and extends along an outer one of the respective pair of side ribs. Each

inner side rib can accommodate a resilient foam plastics cushioning tube.

The side ribs are advantageously deeper than the central ribs so that a recess is defined thereby beneath the central ribs, this recess accommodating a resilient foam plastics material block. The whole mattress can comprise an outer cover of air permeable textile material such as cambric.

The invention will be described further, by way of example, with reference to the accompanying drawings, wherein:—

Fig. 1 is a perspective view, from above, of a preferred embodiment of mattress conforming to the invention; and

Fig. 2 is a cross-section, on an enlarged scale, taken on the line II—II of Fig. 1.

A preferred embodiment of mattress 9 conforming to the invention comprises upper and lower generally rectangular panels 10 and 11 of flexible synthetic plastics material. The panels are attached to each other around their peripheries, for example by being integral or by being welded or sewn. The panels 10 and 11 are further attached together by a plurality of longitudinally extending parallel seams, 12, each of the seams 12 extending from a position near to but spaced apart from one end of the mattress 9 to a position near to but spaced from the other end of the mattress 9. It will thus be appreciated that the seams 12 divide the mattress 9 into two pairs of longitudinally extending side ribs 13, 14 and 15, 16 and a plurality of longitudinally extending central compartments in the form of ribs 17. The mattress has end ribs 18 and 19. That peripheral portion of the upper panel 10 which is above end ribs 18, 19 and side ribs 13, 14, 15, 16 is imperforate, as is the entire lower panel 11, but a central area 20 of the upper panel 10 above the central ribs 17 is provided with a plurality of apertures 21 for a purpose which will be described later.

The ends 18 and 19 are provided with strips 26 of hook and pile material secured thereto to facilitate attachment of the mattress 9 to a support, such as a bed, having complementary strips.

Centrally and longitudinally of each central rib 17 extends a spine 22 of foamed plastics material, each spine 22 being of thickness equal to about that thickness which the central ribs 17 would assume if the mattress 9 was inflated.

Supply means of the mattress comprises a header manifold (not shown) communicating with the ribs 17 and of length equal to about the width of the mattress 10 and disposed inside end rib 18. An end portion 23 of the manifold protrudes from one end of end rib 18. A pair of supply tubes 24, 25 of resilient foam plastics material, extend at right angles from the manifold

and are disposed inside side ribs 13 and 16. Resilient foam plastics material cushioning tubes 27, 28 extend along side ribs 14 and 15.

The side ribs 13, 14, 15, 16 are deeper than the ribs 17 and a recess is thus defined beneath ribs 17 which can accommodate a block 33 of resilient foamed plastics material as an extra support for a patient on the mattress.

The tubes 24, 25 have their open free ends disposed adjacent end portion 19 of the mattress, for supplying air thereto, and each has an aperture close to but spaced from its manifold end for supplying air to the end rib 18. The manifold is, in use, connected to a supply of conditioned air, that is air which has its temperature and humidity controlled and which may be bacteria free.

When a patient is supported by the mattress 9 and the supply of conditioned air switched on, air issues from the apertures 21 in the ribs 17 and ensures a plentiful supply of air to the patient's body. Although the weight of the patient may tend to compress the ribs 17 the spines 22 of foamed plastics material ensure, even when they are fully compressed, that air channels 29 exist on each side of the spines 22 so that air can still reach the patient. The supply of air required is about 50 cubic feet of air per minute.

In order that the mattress 9 is not contaminated by the patient the mattress 9 is surrounded by an air-permeable mattress cover 30. This cover 30 is in the form of a rectangular bag, an upper surface 31 of which is made from fine mesh so as to be readily permeable to air issuing from the apertures 21 in the mattress 10, and the lower surface 32 which is of a less permeable woven textile material. The cover 30 protects the mattress 9 against contamination by the patient but still allows air from the mattress 9 to contact and flow around his body.

The invention is not limited to the precise details of the foregoing description and variations can be made thereto within the scope of the following claims. For example the configuration of the ribs need not be as described and can be varied as desired into any practical arrangement. The mattress need not comprise ribs but could have a plurality of interconnected cells or pockets. The mattress can be made from any air-impervious material such as close-woven textile material or plastic.

As an alternative the upper panel can be made from air-permeable material, for example a textile material and thus be effectively perforate over its entire area.

The supply means need not be as described and the manifold can be disposed

outside and parallel to rib 18, a pair of slits in rib 18 allowing tubes 24, 25 to enter the side ribs 13, 16. The supply means can comprise a plurality of air supply tubes connecting with various points on the periphery or underside of the mattress. The seams 12 can have gaps therein to allow air to pass more easily from tubes 24, 25 to ribs 17.

The spines need not be continuous and each can comprise a plurality of discrete portions of material spaced apart along each rib. Many other variations are, of course, possible.

WHAT WE CLAIM IS:—

1. A mattress comprising a lower panel of air-impermeable material, an upper panel and means for supplying air to the space between the panels the space between the panels being divided into a plurality of compartments each containing a resilient element, and the upper panel having at least part of its area perforate and provided with apertures whence conditioned air from the said compartments can issue and so impinge on and pass around a patient lying on the mattress.

2. A mattress as claimed in Claim 1 wherein the upper panel is of air impermeable material and has a central perforate area surrounded by an imperforate peripheral border.

3. A mattress as claimed in Claim 2, wherein the panels are generally rectangular and attached to each other by seams so dividing the mattress into a plurality of interconnected compartments in the form of ribs.

4. A mattress as claimed in Claim 3 wherein the ribs comprise four side ribs, two disposed side-by-side beneath each imperforate longitudinal edge portion of the upper panel and a plurality of central ribs disposed beneath the perforate area of the upper panel.

5. A mattress as claimed in Claim 4 wherein each central rib has a resilient element in the form of a spine extending therealong.

6. A mattress as claimed in Claim 1 wherein each spine is narrower than the rib so that even if the spine is fully compressed by a patient lying on the mattress

air channels still exist down which air can pass.

7. A mattress as claimed in Claim 5 wherein each spine is in the form of a strip of resilient foamed plastics material.

8. A mattress as claimed in any of Claims 4 to 7 wherein an end rib extends transversely of one end of the mattress and accommodates a header manifold for supplying conditioned air to the mattress.

9. A mattress as claimed in Claim 8 wherein air supply tubes extend down outer ones of the side ribs for supplying air to an end portion of the mattress remote from the end rib.

10. A mattress as claimed in Claim 9 wherein inner ones of said side ribs accommodate respective cushioning tubes of resilient material.

11. A mattress as claimed in Claim 9 or 10 wherein said tubes are of resilient foamed plastics material.

12. A mattress as claimed in any of Claims 3 to 11 wherein the seams are discontinuous to facilitate passage of air to the central ribs.

13. A mattress as claimed in any of Claims 4 to 12 wherein the side ribs are deeper than the central ribs so as to define a recess below the central ribs, which recess accommodates a block of resilient foamed plastics material.

14. A mattress as claimed in any preceding Claim wherein a cover is provided in the form of a bag having an air permeable upper surface which may protect the mattress from contamination by a patient but still allow air from the mattress to reach the patient.

15. A mattress as claimed in Claim 1 wherein the upper panel is of air permeable material.

16. A mattress substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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